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TECHNICAL REPORT

Current Practices and Challenges in Smallholder Irrigation Water Management: A WEFE Nexus-Based Assessment

The Case of the Meki Catchment

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Front cover photo: Irrigation of wheat field from Meki River at Jole Kebele (*photo*: Meron Teferi Taye/IWMI)
Back cover photo: Experts visiting vegetable irrigation from shallow groundwater using motor pump (*photo*: Meron Teferi Taye/IWMI)

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Summary

Ethiopia is promoting multiple-season food production through irrigation for food security and improving livelihoods of rural farmers. Maximizing the productivity of irrigated agriculture requires ensuring reliable water and energy systems among other inputs. This brief describes the current irrigation practices in the Meki catchment of the Rift Valley Lakes Basin, Ethiopia, where farmers use both surface and groundwater sources. As irrigation expansion will occur throughout the country, this brief draws on the Meki catchment example, to provide recommendations on how to scale irrigation with sustainable use of water. It alerts practitioners and policy makers to exercise caution as unsustainable water abstraction can risk the long-term viability of irrigation systems.

Key Messages

- In the Meki catchment, farmers experience water use conflicts due to uncoordinated surface water withdrawals between upstream and downstream users, which at times lead to rivers drying up in the peak irrigation season.
- Farmers believe that current irrigation expansion is constrained by limited access to affordable energy rather than groundwater availability and they request support to access solar pump systems.
- As access to energy improves through promotion of solar irrigation technologies, the risk of unsustainable groundwater abstraction rises with dire implications for sustainable irrigation systems.
- The need for coordination and regulation of water use from both surface and groundwater sources is essential for the long-term sustainability of irrigation expansion.
- For better planning and allocation of water resources, we recommend monitoring water use, estimating water availability potential from surface water and groundwater sources, and accurately assessing irrigated areas.

Introduction

The need for increased food production is leading smallholder farmers to adopt various irrigation systems for multi-season production in Ethiopia to improve food security and rural livelihoods (Balasubramanya and Lele, 2022; Harmon et al., 2023). While irrigation water withdrawals from rivers, groundwater, and lakes are positively contributing to increased food production, crop diversification, and higher incomes (Birhanu et al. 2025), uncoordinated water abstractions are putting pressure on ecosystems maintenance and environmental sustainability in locations where there is over abstraction (e.g. Ayenew 2004; Goshime et al 2021a). Water withdrawal from rivers, lakes and groundwater often requires energy use to divert water to farms. Motorized pumped irrigation has been commonly run with diesel fuel, at times leading to over abstraction of water from these sources. More recently the potential of promoted solar irrigation is estimated to be promising (Wamalwa et al. 2024), but the availability of cheaper energy options can lead to increase over abstraction of water as seen in India (Srivastava et al. 2025), MENA (Dawoud 2025) among other places that can raise sustainability questions.

In the context of smallholder irrigated agriculture, utilizing surface or groundwater with application of either diesel or solar pump requires resource management and optimization across the water, energy, food and environment sectors. The Water–Energy–Food–Environment (WEFE) nexus approach can be applied to this context as WEFE Nexus treats these sectors as interconnected systems that have links and feedback loops that require an integrated approach of resource use to avoid tradeoffs among sectors (UNESCO, 2021). Application of the WEFE nexus approach can optimize resource use, enhance resilience, and mitigate potential tradeoffs across sectors that utilize and depend on shared resources. Smallholder irrigated agriculture can therefore be tailored to benefit farmers and maintain ecosystems using the WEFE nexus approach.

Smallholder irrigation in Ethiopia, with an average plot size of 1 ha, utilizes both surface water and groundwater sources albeit without coordination. The consensus among water and agricultural experts is that smallholder irrigation is expanding (Gebul, 2021) although the actual area size under irrigation is non-conclusive. There are several factors that make the mapping of the actual irrigation area challenging. For instance, farmers rotate irrigation areas from one season to the next, they may not always have the energy source to run their motors (to draw water) leaving some of the land un-irrigated, and other financial limitations (that fluctuate from year to year) can further influence actual irrigated area size. As per the Ministry of Agriculture (MoA) Smallholder Irrigation Development office, about 207,230 ha of new land have been developed during the 2021-2025 period (MoA, 2026) indicating the expansion of smallholder irrigation.

Most of this smallholder irrigation expansion is based on surface water sources followed by groundwater. In some locations uncoordinated and uncontrolled water abstraction has led to unsustainable resource use and depletion of water resources. There are examples of rivers drying up during the dry season, groundwater levels declining, and lake levels dropping in Lake Haromaya, Lake Abiyata and Lake Ziway, which were highlighted by the scientific community at different times in the past (e.g. Alemayehu et al, 2007; Goshime et al 2019; Negussie et al. 2025).

Adoption and implementation of smallholder irrigation by farmers usually outpaces proper water availability planning as it is driven by income generation through cash crop production, as visible in the case of Fogera in the Blue Nile, Central Rift Valley basin, and in Lake Haromaya cases (Dessalegn and Merrey, 2015; Goshime et al. 2021b; Erena et al. 2023). These experiences show that the use of water abstraction from surface and groundwater is not systematic. The risk of resource depletion is high as more farmers benefit from irrigation systems. Therefore, there is a need to better understand the current practices and challenges along the water, energy, food and environmental aspects of smallholder irrigation in Ethiopia.

The Meki catchment was selected as a case study to conduct a WEFE nexus-based assessment of smallholder irrigation water management in Ethiopia because it is a prime example of where the presence of smallholder irrigation using both surface and groundwater is significant and the use of solar pumps for irrigation is expanding (Negera et al. 2025). While food production in the catchment is increasing, the challenge of environmental sustainability is also growing. Therefore, this brief focuses on highlighting the current practices and challenges in the Meki catchment as a hotspot for smallholder irrigation expansion.

Study Area

The Meki catchment in the Central Rift Valley is located in the southern part of Ethiopia (Figure 1). It has a drainage area of 2183 km^2 with elevation ranging between 1653 m and 3614 m above mean sea level (Taye et al., 2022). The Gurage mountains form the western boundary of the catchment from which rivers originate and drain to the eastern flatlands (Legesse et al. 2010). Meki River is one of the main tributaries draining to Lake Ziway and its sustainable management has implications on the Lake ecosystem. The climate is semi-arid with average annual precipitation of 940 mm and the main rainy season between July and September. The long-term average minimum and maximum temperatures in the area are 12° and 26 C, respectively.

The catchment is characterized by dominant agricultural lands, water bodies, groundwater and ecosystems that support biodiversity and livelihoods. Water availability in the Meki catchment is highly seasonal, rainfall fluctuates and surface water resources are often depleted in the dry periods (October to May) when agricultural demand peaks. During the dry season, irrigated agriculture produces cash crops, predominantly tomatoes and onions. Rainfed agriculture is centered on growing cereals (teff, wheat, maize, barley, sorghum) and false banana (enset) (Taye et al. 2022). Both river and groundwater sources are used for irrigation. Groundwater use is dominant in areas such as Misrak Meskan woreda[1] and Butajira town (Hulluka et al. 2024) from a total of 10 woredas that intersect with the catchment. Water resources serve a multitude of competing needs, including domestic consumption, agriculture, livestock, and the maintenance of vital ecosystems.

[1] woreda is the third-level administrative unit in Ethiopia, similar to a district. It is a local government unit.

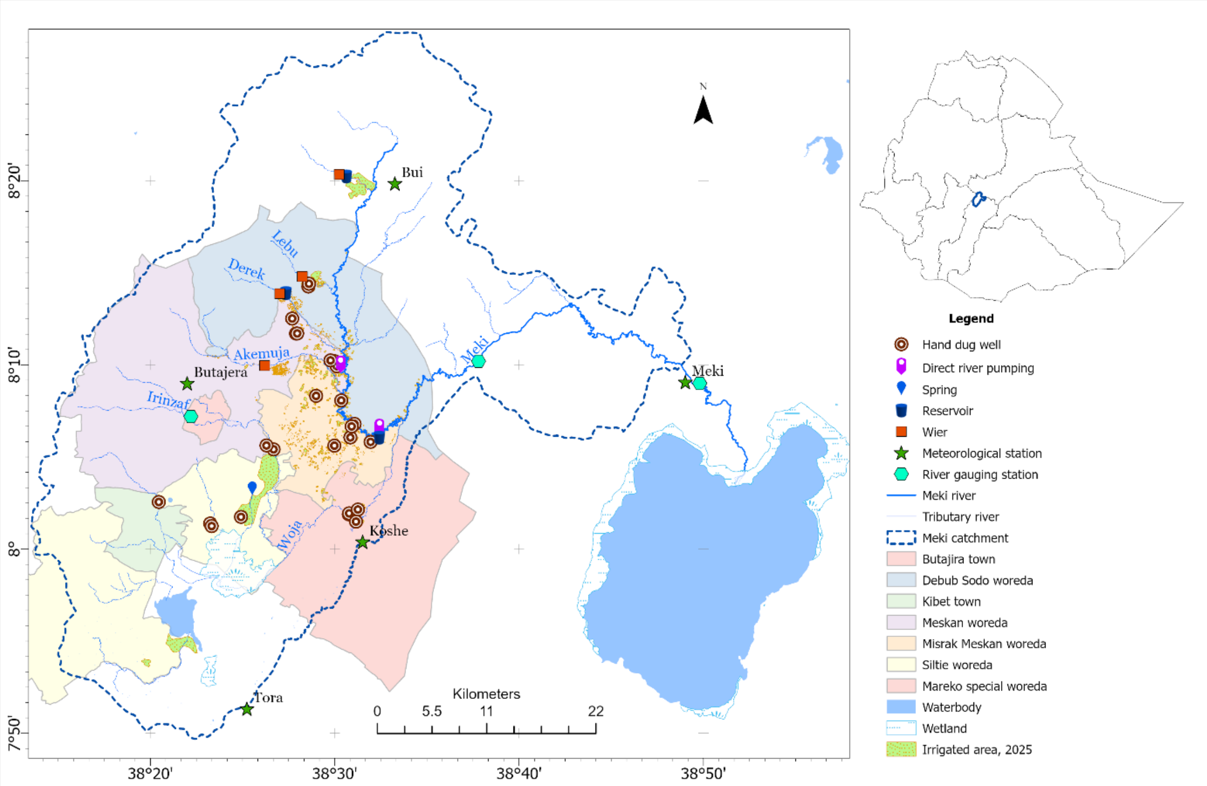

Figure 1. Location of Meki catchment and water abstraction locations visited during field mission in March 3-7, 2026.
Source: Authors' creation

Methodology

This study used two approaches: literature review and field visits. Literature review was based on literature search from Google Scholar (https://scholar.google.com/), Science Direct (https://www.sciencedirect.com/), and Springer (https://link.springer.com/). The literature search used the following keywords "Meki catchment" AND "smallholder irrigation", "water shortage", "surface water", "groundwater", "uncoordinated water use", "water allocation", "water use conflict", "environmental flow" and "solar pump". A various combination of these terms produced about 40 publications. In addition, the snowball approach was used if a keyword search did not yield results. After removing duplicate records and screening titles and abstracts for topics that were not relevant for WEFE nexus and smallholder irrigation water use in the Meki catchment, a total of 20 publications were used for framing issues in the catchment. The types of included publications were peer-reviewed journal articles, book chapters, and reports.

Field visits were conducted to five woredas in the catchment during March 3-7, 2026. These woredas are Meskan, Misrak Meskan, Silte, South Sodo and Mareko Special woredas (Figure 1). In these locations, the objectives were: understanding the use of surface and groundwater for irrigation, identifying areas that irrigate using one source of water and areas that use both surface and groundwater sources, measuring the depth of groundwater wells and their geographic locations, observing the existing challenges of farmers from water and energy use perspective. Information on the type of crops produced by irrigation and the number of irrigation seasons was collected from interviewing farmers and by observing farms that were under irrigation.

The findings and recommendations are synthesized from water, energy, food and environmental nexus perspectives.

Key Findings

Water System

Irrigation is expanding in the catchment from surface and groundwater sources.

In the Meki catchment, irrigation is used by both smallholder farmers and large commercial farms. Irrigation is practiced twice a year after the main rainy season when rainfed production is common. Interviewed farmers indicated that there is agricultural activity all year round. Small-scale irrigation utilizing water from both rivers and from shallow groundwater is expanding (ElDidi et al. 2023). Scientific literature indicates that the most common water source for irrigation expansion is the main Meki River and its tributaries using canal diversion (Goshime et al. 2021; Taye et al. 2022). This includes reported reduced flow in Meki River because of increased dry season irrigation in the upstream woredas (Desta et al 2020; Abegeja and Nedaw, 2025) and by both large- and small-scale irrigation schemes (Goshime et al., 2019). Irrigation based on river water diversion from tributary rivers is common in the upstream part of the catchment in South Sodo and Meskan woredas as observed during the field visits and from the main Meki River at different downstream locations (Figure 2). Farmers also indicated that when water is diverted in the upstream areas, the rivers can dry in the downstream areas, and they are forced to use groundwater to irrigate their farms. There are numerous hand-dug wells in the catchment where vegetable irrigation is commonly practiced (e.g. 16000 wells in Silte and 9800 wells in Misrak Meskan woredas as per the data from the woredas). This indicates that, in the existing situation, surface water use for the expanding irrigation in the upstream part is leading to water scarcity in the downstream part of the catchment. Moreover, studies have shown that the existing surface water sources are not enough to sustain current and future projected irrigation increases (Shumet and Mengistu, 2016; Gosheme et al. 2021; Musie et al. 2021; Abegeja and Nedaw, 2025).

Figure 2. Irrigation from Meki River at Jole Kebele using motor pump for onion and wheat crops, illustrating the water, energy, food, environment nexus (*photo:* Meron Teferi Taye/IWMI)

Water use conflicts occur due to uncoordinated surface water withdrawal between upstream and downstream users.

One of the areas with high irrigation potential is the Misrak Meskan woreda in the middle part of the Meki catchment where irrigation expansion from both surface water and groundwater sources is occurring. In this district, an estimated irrigated area comprises 11,500 ha. The river that supplies irrigation water has low potential for irrigation during the dry season since the upstream users heavily consume water for irrigation (Bantider et al. 2023). This leads to conflict between the upstream and downstream users. During the dry season, when water in the river is not enough for irrigation, the downstream farmers are forced to irrigate their land using groundwater and small streams (Bantider et al. 2023). Similar situation is reported between Meskan woreda and the downstream Dugda woreda where downstream users have a sentiment of unfair water allocation and distribution (Jibaat et al. 2024). During the field visit, farmers in the South Sodo woreda indicated that when such conflicts occur the farmers' association attempts to resolve it by deciding the amount of land that a farmer can irrigate (e.g. 0.5 ha per farmer based on irrigation scheduling). Such efforts are encouraging but they need to be supported by water availability assessments and demand estimates, to improve planning before conflicts occur.

Additional water management challenges contribute to the water use conflicts. For instance, challenges of low water use efficiency due to poorly constructed canals (Aman et al 2020), poor on-farm water management (Haileslassie et al. 2016), and furrow irrigation system.

Surface water and groundwater use is uncoordinated.

The current practice by smallholder farmers is that they rely on the surface water sources until the rivers dry up (Jibaat et al. 2024), then they shift to groundwater sources or groundwater use is more pronounced in the downstream parts of the catchment when the rivers flow do not reach that part of the catchment (Bantider et al. 2023). The switch from the river water to groundwater is spontaneous and not necessarily well planned or systematized. In the field visits, an interesting observation was that direct pumping from rivers occurs in farms located close to a river, approximately within 500 meters range. Those farms that are away from the rivers and have access to shallow groundwater rely on groundwater irrigation. The number of direct pumps from rivers is not known or regulated. Similarly, water pumping in the hand dug wells, is not regulated. When the water table falls, the farmers dig deeper to obtain more water from the wells. Some farmers indicated that they run their pumps continuously irrigating different farms day and night.

Shallow groundwater availability is expanding groundwater-based irrigation.

As irrigation from surface water is challenged by water shortages, studies are suggesting the need for groundwater exploitation for irrigation (Abegeja and Nedaw, 2025). Farmers already realized shallow groundwater availability in most woredas of the catchment and are expanding irrigation using this resource. However, the amount of available groundwater and the total area it can irrigate is not fully understood. Some studies estimated groundwater potential zones and groundwater recharge amounts. For instance, Ayenew (2008) analyzed the hydrological system and groundwater recharge of the Meki catchment and found that the catchment has fast response to rainfall recharging the groundwater. Abegeja and Nedaw, (2025) showed that approximately 65% of the catchment has high to good groundwater potential. The flat plains that receive water from the highlands and the middle part of the catchment are characterized by this high to good groundwater potential. Hulluka et al. (2024) also confirmed the flat areas of the catchment have high shallow groundwater potential. These locations coincide with the irrigation farms located in Misrak Meskan, Mareko and Silte woredas visited during the field visit (Figure 3). It was observed that the land is flat and suitable for irrigation in most of these places.

Unlike surface water sources, overextraction and competition over groundwater have not yet reached alarming levels given that farmers are limited by access to motorized pumps and the financial capacity to dig deeper wells (ElDidi et al., 2023), and complicated by the rising fuel costs even before the ongoing US-Iran conflict. Farmers interviewed during March 2026 field visit believe that groundwater is available and sufficient to irrigate as they claim that if one digs anywhere, one can find water easily from a close distance. The water levels in groundwater wells were measured during the field visits, and the levels ranged from 2 to 20.5 meters below the ground surface. While the farmers stated that the water level rises during the rainy season, it is not clear by how many meters it fluctuates. The farmers, however, use rise of the water level during the rainy season as evidence of shallow groundwater availability. The main challenges, according to farmers, are the low water extraction capacity, lack of resources relevant for farming, and financial constraint to obtain those.

Figure 3. Onion and Kale in Silte woreda produced from groundwater irrigation (*photo:* Meron Tefere Taye/IWMI)

Energy System

Cost of energy use for irrigation is expensive for smallholder farmers.

Energy for smallholder irrigation in Ethiopia has conventionally been dependent on diesel-powered pumps. This is true for the Meki catchment. Most of the surface-water based irrigation systems use diesel pumps if it is not a gravity-based irrigation system. Similarly, pumping for irrigation from shallow groundwater depends on motor pumps. Farmers indicated that increasing fuel prices and poor accessibility of fuel in rural areas are the main challenges for them, that disrupt irrigation schedules and significantly reduce productivity. Moreover, high maintenance and repair costs place further pressure on the farmers (Dejene at al. 2025). In a study by ElDidi et al. (2023), most farmers reported that they do not have access to a motorized pump for irrigation. Those without access to pumps usually rent out their land during the dry season to investors who own motorized pumps and can irrigate. Therefore, the current irrigation-related energy use in the catchment is mostly diesel-based pumping.

There is high interest in obtaining solar pumps for irrigation.

The Ethiopian government is actively promoting irrigation as a strategy including the transition of existing diesel-based pump users to solar-powered pump irrigation, and additional expansion of new solar pump irrigation (Otto et al 2018). For instance, the Ministry of Water and Energy plans to replace 50% of diesel irrigation pumps with solar-powered alternatives by 2030 as per the Sustainable Energy Development Strategy for 2024-2030 (Dejene at al. 2025).

The International Water Management Institute (IWMI) has been promoting the use of solar pump irrigation in Ethiopia since 2016 (Schmitter et al. 2016) in collaboration with the government bodies working on agriculture and irrigation. For example, solar irrigation systems implemented by IWMI and partners in Misrak Meskan woreda showed that the farmers mainly grow vegetables and harvest up to three seasons a year from shallow groundwater sources, which has been contributing to increasing crop yields and improving livelihoods (Dejene et al 2025). Solar pump adoption is therefore increasing for shallow groundwater-based irrigation. In this woreda alone about 50 solar pumps are available (personal communication with woreda representative and IWMI's records). Farmers interviewed during the field visit indicated that they are highly interested in obtaining solar pumps to increase their crop production. However, they do not have the financial capacity to buy these pumps. Hence, farmers are financially challenged by the rising diesel cost for diesel pumps and the upfront cost for solar pumps (Negera et al. 2025).

Sustainability considerations of groundwater use under expanding energy access.

While current irrigation expansion is constrained by limited access to affordable energy, the situation may change rapidly with increased adoption of affordable, solar-powered pumping systems accelerated by the Sustainable Energy Development Strategy for 2024-2030. At present, most smallholder farmers lack the financial capacity to invest in motorized or solar pumps, which limit groundwater abstraction. However, as access to energy improves, particularly through subsidized or promoted solar irrigation technologies, the risk of unsustainable groundwater extraction will increase substantially.

Unlike diesel pumps, solar-powered systems have low operating costs, which can incentivize continuous pumping without regard to resource limits. This may lead to the over-abstraction of shallow groundwater, the decline of water tables, and the reduction of long-term resource availability. Therefore, while the transition to solar irrigation offers clear benefits in terms of energy cost reduction and climate resilience, it must be accompanied by robust groundwater management strategies.

Sustainable use of groundwater will require integrating energy interventions with water resource assessments, including estimates of groundwater availability, recharge rates, and irrigation demand. Without such measures, improved energy access could unintentionally accelerate groundwater depletion, undermining the long-term viability of irrigation systems in the catchment.

Environmental Aspect

Emerging environmental challenges

From the water sustainability perspective, the drying of rivers during the peak irrigation season is a major challenge faced in the catchment. The aspect of environmental flow, which indicates the amount of flow in the river needed to sustain aquatic ecosystems (e.g., movement of nutrients, aquatic biota, sediments and the need for ecosystems in general), is given limited attention as the rivers end up without water in some months of the year hindering availability of water for nature. This requires due consideration as expanding irrigation is already drying rivers in the catchment.

The field visit observed that vegetables such as onion, tomato, kale, green pepper, cabbage, and beet root, are common crops for smallholder farmers. In the farms that produce tomatoes, the plant needs to be elevated from the ground using wooden sticks and threads made of plastic (Figure 4). The use of this plastic material might be a problem in the future for the soil and plants because microplastics could contaminate the soil and plants as they are not biodegradable. This aspect requires research to understand the potential negative impacts on environmental and human health.

Additional environmental concerns include greenhouse emissions from diesel-based motor pumps and noise pollution. The effort to replace these with solar powered pumps can potentially address this environmental concern while how solar panels will be discarded at the end of their life and their environmental impact is yet to be understood and solved.

Figure 4. Tomato irrigated from groundwater wells in South Sodo woreda, the white threads are used to elevate the plant from the ground. It is made of plastic material (*photo:* Meron Tefere Taye/IWMI)

Food System

Farmers experience significant post-harvest challenges

Due to increased irrigation farmers are increasing their production leading to better food security and income. However, at times, since vegetables are the main crops produced in the catchment, if produce cannot be used at home or find a market in a reasonable time, the likelihood of post-harvest loss is high. Farmers indicated that post-harvest losses are substantial, particularly for perishable vegetables, which have a short shelf life especially given the lack to safe storage facilities. Moreover, farmers indicated that although the catchment is close to market centers, including Addis Ababa, they sometimes face bankruptcy due to market price fluctuations. Smallholder farmers in these circumstances are at times forced to lease their farmlands to commercial farmers during the irrigation seasons.

Synthesis of WEFE Nexus Interlinkages

Water: is the medium connecting all sectors. In irrigated agriculture, water availability, has the potential to improve food security and is currently supported by the Ethiopian government initiatives like the Sustainable Energy Development Strategy for 2024-2030. While there is sentiment that there are enough surface water and groundwater for food production, increasing use of motorized pumped irrigation is starting to affect the environment and creating upstream and downstream tensions.

Energy: is key for improving food security and increasing farmers' income by providing access to alternative water sources to farmers during the dry season. At the same time, access to subsidized energy can lead to overextraction of surface and groundwater and environmental degradation by preventing or reducing environmental flow in rivers.

Food: is a requirement for active and healthy life. Water and energy are critical to increase safe and nutritious food production. Without the proper planning and safeguards, increased production can lead to increased food losses that translate into resource losses. Increasing production without damaging the natural environment is a sustainability challenge that also needs to be addressed.

Environment: is mostly overlooked sector when developmental activities intensify. The sign of overextraction of water is already visible in surface water sources as rivers dry in peak irrigation seasons. Careful considerations and guidelines are needed on surface and groundwater use as the sustainability of current groundwater use is questionable and there is a high potential for over abstraction of water as irrigation further expands.

Supporting Mechanisms

Irrigation water governance is lacking for both surface and groundwater sources.

At community level in the Meki catchment surface and groundwater use and management related rules or arrangements do not exist (ElDidi et al., 2023). In south Sodo woreda, the woreda officials indicated that there are farmers associations that attempt to resolve water conflicts by allowing farmers to irrigate a given hectare of land (usually 0.25 or 0.5ha). Other than this specific case, farmers indicated that they freely irrigate from rivers or wells as much as they need for their crops. Groundwater related institutions, regulations and committees exist for communal water resources, such as shared springs and drinking water wells that are provided by the government. Such regulations do not apply to privately dug wells on private land that are used for irrigation. Communities believe that groundwater on one's land is private property and that groundwater is currently not yet scarce and thus there is no need for rules to govern groundwater use (ElDidi et al., 2023).

The situation is not any different at a basin level. Coordinated basin-level guidelines and enforcing mechanisms for irrigation water use from surface and groundwater sources are not available. Although water resources management should follow hydrological boundaries, the current governance system that follows administrative boundaries result in fragmented planning, and poor coordination of irrigation projects or water use by individual farmers. There is no water allocation plan at the catchment level that includes both water sources and the dynamics of upstream-downstream water use. The unavailability of a clear water allocation plan is therefore the potential cause of water use conflicts.

Moreover, there is limited awareness and technical capacity among local farmers and irrigation water user associations (IWUAs) regarding efficient irrigation techniques to conserve water for others as the common irrigation practices are furrow and flood irrigation. Furrow irrigation is what is observed in all locations visited during the field visit. It is also possible that farmers may also lack awareness of the benefits of coordinated water use among themselves or from both surface and groundwater sources.

In Ethiopia irrigation development management involves government structures from federal to regional and woreda levels. The MoA has smallholder irrigation section that has been working up to woreda level in the past. At woreda level, there are agricultural offices that support farmers and provide agriculture extension work. However, irrigation may not be explicitly mapped to a given government structure at woreda level. Recent government structures indicate irrigation related responsibility are given to the new Ministry of Irrigation and Lowlands. However, the lack of clarity on mandates among government institutes, limited financial resources, skills and knowledge within the local government hinders how irrigation development should be handled. There is also lack of regulatory guidelines, insufficient legal clarity and enforcement mechanisms on water abstraction for irrigation. This is a challenge that requires attention by the government to avoid over exploitation of water resources and potential conflicts among water users.

There are limited data, information and tools that can be used for smallholder irrigation water management.

In most woredas, there is information about what is planned to be irrigated and the total number of wells developed. However, specific information regarding the geographic locations of wells, how much water they pump, and how much area they each irrigate is not available. The woreda officials in the catchment indicated that such data would be useful to know their water system and would be happy if they were scientifically and financially supported to share such capacity at local level.

Generally, at a basin level, data for water resources understanding is lacking. For instance, reliable measurements of river flow and groundwater levels are not available. River flow stations are not currently operational in the catchment. To understand the sustainability of water resources as irrigation expands, accurate estimates of irrigated areas and their water sources are important data that should be monitored. These and other relevant information such as the estimates of water use for crop production, livestock, industry, and domestic needs, including population data and energy demand estimates (for solar and diesel-powered systems) are highly important to prevent the over abstraction of water, provide equitable water allocation system and avoid common water use conflicts.

Conclusions

Evidence-based decision making in the irrigation sector requires monitoring or estimating current water usage from different sources, better knowledge of irrigated areas, and an understanding of the dynamics between upstream and downstream users. To this end, based on this study's analysis, the current knowledge of the farmers is that water is readily available, especially from groundwater sources, and the only constraint is a lack of energy. Therefore, there is a need to estimate water availability from surface and groundwater sources and to understand the sustainability aspects if irrigation is going to expand in the catchment. In follow-up work, IWMI will generate evidence on water availability in irrigated areas in the Meki catchment, and experiment with approaches for conjunctive use of surface and groundwater for irrigation.

Given that key basin institutions such as the Rift Valley Lakes Basin Office require higher capacity to develop and enforce basin plans, administer and monitor water use volumes and allocation, including accounting for energy and environmental needs, IWMI will provide technical support and organize policy dialogues with the government decision-making bodies.

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